

PATENT COOPERATION TREATY


PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)



Applicant's or agent's file reference 904 151		FOR FURTHER ACTION	See Form PCT/IPEA/416
International application No. PCT/JP2004/010092		International filing date (day/month/year) 08.07.2004	Priority date (day/month/year) 23.07.2003
International Patent Classification (IPC) or national classification and IPC F16D3/84, F16H48/06			
Applicant TOYOTA JIDOSHA KABUSHIKI KAISHA et al.			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 4 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input checked="" type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand 14.03.2005		Date of completion of this report 22.09.2005	
Name and mailing address of the International preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized Officer Foulger, M Telephone No. +49 89 2399-2960	



**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/JP2004/010092

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

Description, Pages

1-15 as originally filed

Claims, Numbers

2-4, 6-9 received on 14.03.2005 with letter of 11.03.2005

Drawings, Sheets

1/9-9/9 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/JP2004/010092

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	2-4,6-8
	No: Claims	9
Inventive step (IS)	Yes: Claims	2-4,6-8
	No: Claims	9
Industrial applicability (IA)	Yes: Claims	2-4,6-9
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Reference is made to the following documents:

- D2: US-A-2 875 599 (GREGORY BENJAMIN F) 3 March 1959 (1959-03-03)
D4: US-A-5 916 055 (WORMBAECHER HANS) 29 June 1999 (1999-06-29)

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Claims 2,3,4,7,8

1.1 Closest Prior Art

The nearest prior art is considered to be D4 which shows:

- a power transmission apparatus comprising:
- a first power transmission member **(32)**
- a casing **(14)** provided with an opening that opens towards said first transmission member,
- a constant velocity universal joint **(34)** connected to said first power transmission member and
- a second power transmission member **(30)** connected to said first power transmission member via said constant velocity universal joint.

1.2 Problem To Be Solved

The problem to be solved may therefore be regarded as how to provide an arrangement which can use a simpler sealing arrangement than the flexible boot of the prior art and which is not so prone to damage.

1.3 Solution

The problem is solved by the arrangement of the outer race of the constant velocity joint as described in the independent claims 2,3,4,7,8. Although this consists merely in the constant velocity joint of the arrangement known from D4 being turned round such that its outer race opens towards the inside of the casing; this modification is not

considered obvious as it would require a complete redesign of the prior art apparatus which would also result in a larger apparatus.

2. Claim 6

Claims 6 concern further preferred embodiments of the invention according to claims 2-4.

3. Claim 9

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 9 is not new in the sense of Article 33(2) PCT.

D2 discloses,

a power distribution apparatus comprising:

an output (**col. 1, lines 63 & 64**) shaft (**4**) and

a propeller shaft (**5**) connected to said output shaft via a constant velocity universal joint, wherein

an end of said propeller shaft has an inner surface defining an internal cavity (**6**) that opens towards said output shaft,

an outer race (**3**) of said constant velocity joint is formed at said inner surface, and

an inner race (**2**) of said constant velocity universal joint is formed at a surface of said output shaft, (**see also Fig. 1**).

Therefore all features of claim 9 are known from D2.

Re Item VII

Certain defects in the international application

- a. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.
- b. The independent claims are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in

combination from the prior art being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

- c. The claims are not numbered consecutively (Rule 6.1(b) PCT).

Re Item VIII

Certain observations on the international application

- c. Although claims 2,3,4,7,8 have been drafted as separate independent claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought. The aforementioned claims therefore lack conciseness and as such do not meet the requirements of Article 6 PCT.

CLAIMS

1. (Cancelled)

2. (Amended) A power transmission apparatus comprising:

5 a first power transmission member (11, 12),

a casing (19) provided with an opening (19k) that opens towards said first power transmission member,

a constant velocity universal joint (41, 42) connected to said first power transmission member, and

10 a second power transmission member (17, 18) connected to said first power transmission member via said constant velocity universal joint, wherein

an outer race (11a, 12a) of said constant velocity universal joint is formed integrally to a casing side end of said first power transmission member,

15 an inner race (17a, 18a) of said constant velocity universal joint is formed integrally to said second power transmission member,

said outer race is disposed so as to block said opening,

said first power transmission member includes a drive shaft (11, 12),

said casing includes a diff case (19) of a differential gear, and

said second power transmission member includes a side gear (17, 18).

20 3. (Amended) A power transmission apparatus comprising:

a first power transmission member (11, 12),

a casing (19) provided with an opening (19k) that opens towards said first power transmission member,

25 a constant velocity universal joint (41, 42) connected to said first power transmission member, and

a second power transmission member (17, 18) connected to said first power transmission member via said constant velocity universal joint, wherein

an outer race (11a, 12a) of said constant velocity universal joint is formed integrally to a casing side end of said first power transmission member,

an inner race (17a, 18a) of said constant velocity universal joint is formed integrally to said second power transmission member,

5 said outer race is disposed so as to block said opening,
 said first power transmission member includes a propeller shaft (111),
 said casing includes a diff carrier (30) of a differential gear, and
 said second power transmission member includes an input shaft (27) of said differential gear.

10

4. (Amended) A power transmission apparatus comprising:

a first power transmission member (11, 12),

a casing (19) provided with an opening (19k) that opens towards said first power transmission member,

15

a constant velocity universal joint (41, 42) connected to said first power transmission member, and

a second power transmission member (17, 18) connected to said first power transmission member via said constant velocity universal joint, wherein

20 an outer race (11a, 12a) of said constant velocity universal joint is formed integrally to a casing side end of said first power transmission member,

an inner race (17a, 18a) of said constant velocity universal joint is formed integrally to said second power transmission member,

said outer race is disposed so as to block said opening,

said first power transmission member includes a propeller shaft (111),

25

said casing includes a casing (230) of a power distribution apparatus, and

said second power transmission member includes an output shaft (227) of said power distribution apparatus.

5. (Cancelled)

6. (Amended) The power transmission apparatus according to any one of claims 2 - 4, wherein an outer surface of said outer race has a spherical configuration,
5 said power transmission apparatus further comprising a seal member (33, 34) forming contact with a surface of said opening and an outer surface of said outer race.

7. A differential gear comprising:
a side gear (17, 18), and
10 a first power transmission member (11, 12) connected to said side gear (17, 18) via a constant velocity universal joint (41, 42), wherein
an end of said first power transmission member has an inner surface (11c, 12c) defining an internal cavity (11d, 12d) that opens towards said side gear,
an outer race (11a, 12a) of said constant velocity universal joint is formed at
15 said inner surface,
an inner race (17a, 18a) of said constant velocity universal joint is formed at a surface of said side gear.

8. (Amended) A differential gear comprising:
20 an input shaft (27) provided at a side closer to a ring gear, and
a first power transmission member (111) provided at a side farther from the ring gear, connected to said input shaft via a constant velocity universal joint (141), wherein
an end of said first power transmission member has an inner surface (111c)
25 defining an internal cavity (111d) that opens towards said input shaft,
an outer race (111a) of said constant velocity universal joint is formed at said inner surface, and
an inner race (27a) of said constant velocity universal joint is formed at a

surface of said input shaft.

9. A power distribution apparatus comprising:

an output shaft (227), and

5 a propeller shaft connected to said output shaft via a constant velocity universal joint (241), wherein

an end of said propeller shaft has an inner surface (111c) defining an internal cavity (111d) that opens towards said output shaft,

10 an outer race (111a) of said constant velocity universal joint is formed at said inner surface, and

an inner race (227a) of said constant velocity universal joint is formed at a surface of said output shaft.

10. (Cancelled)